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09/992,578	11/06/2001	Ja-Young Koo	81758	9881
23685	7590	04/08/2004	EXAMINER	
KRIEGSMAN & KRIEGSMAN 665 FRANKLIN STREET FRAMINGHAM, MA 01702			MENON, KRISHNAN S.	
			ART UNIT	PAPER NUMBER
			1723	

DATE MAILED: 04/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/992,578

Applicant(s)

KOO ET AL.

Examiner

Krishnan S Menon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-29, 58-61 and 71-78 is/are pending in the application.
- 4a) Of the above claim(s) 76-78 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-29, 58-61 and 71-75 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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### **DETAILED ACTION**

Claims 1-8, 10-29, 58-61 and 71-78 are pending.

#### ***Claim Objections***

Claim 17 is objected to because of the following informalities: the formula in claim 17 which has an R5 attached to the CH2 group within parenthesis is in error because the carbon in the CH2 group is shown as having 5 bonds. Appropriate correction is required.

#### ***Election/Restrictions***

Newly submitted claims 76-78 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 76-78 are directed at a neutrally charged membrane, which is a new, patentably distinct, species that was not originally presented.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 76-78 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

#### ***Claim Rejections - 35 USC § 102***

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-8, 10-15, 17-28, 58-61 and 71-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mickols (853) in view of Marinaccio et al (US 4,915,839).

Claims 1 and 58: Mickols teaches a reverse osmosis membrane comprising a microporous support a polyamide layer on the microporous support (col 3 lines 10-20) and a hydrophilic coating of an crosslinked epoxy compound (col 4 lines 25-46) as in claim 1. However, Mickols teaches a di-epoxide, not an epoxide having at least three epoxy groups. Mirinaccio teaches three epoxy groups in cross-linking a membrane (see structures in col 12). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Marinaccio in the teaching of Mickols for having cationic, anionic or zwitterion membranes because it makes the membrane sanitizable

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or sterilizable, and capable of capturing anionic, cationic and other particles smaller than the effective pore size of the membrane (Marinaccio col 5 line 55 – col 6 line 11).

Cross-linking with the help of a cross-linking compounds – see Marinaccio col 9 line 61 – col 14 line 10); cross-linked through self polymerization: inherent from Mickols in view of Marinaccio; similar reagents as used by the applicant should produce similar products The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. “The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness.” In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). Re claim 58, Mickols teaches a microporous membrane with a hydrophilic coating, as above (claim open-ended).

Claims 2 and 59: microporous support is polysulfone, etc. (Mickols col 6 line 5)

Claim 3: polyamide layer by interfacial polymerization (Mickols col 3 lines 10-28)

Claims 4-6: polyfunctional amine is an aromatic primary amine, and metaphenylene diamine or piperazine (Mickols col 3 lines ).

Claim 7, 8: polyfunctional acyl halide (Mickols col 3 lines 10-28); trimesoyl chloride (Mickols col 3 line 55)

Claims 21 and 22: Claim 21 is made independent by the new amendment, but is similar to claim 1, with the exception of the polyfunctional epoxy having exactly two

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epoxy groups (Mickols examples, col 4 lines 27-45); resulting compound is water insoluble. Claim 22: ethylene glycol diglycidyl ether (Mickols example);

Claims 23, 24: cross-linking compound has at least three epoxy-reacting groups; such as amine, or carbonyl (Mickols claims 13 and 16; col 4 lines 15-59, especially 37-46; col 5 lines 10-62)

Claims 25, 26: three epoxy reactive groups the same – the polyamide layer; or different (Mickols col 4 lines 15-59, col 5 lines 10-63)

Claims 60 and 61: microporous support is a microfiltration or ultrafiltration membrane: Mickols col 6 lines 1-15; col 1 lines 16-30.

Claim 10 and 73: one or more of the compounds listed are taught by Marinaccio (col 14 lines 1-68)

Claim 11: cross-linked through self polymerization: inherent from Mickols in view of Marinaccio; similar reagents as used by the applicant should produce similar products. The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also *In re Grasselli*, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983).

Claim 12: cross-linking with the help of a cross-linking compound – see col 9 line 61 – col 14 line 10)

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Claim 13: epoxy reactive groups amino or carboxyl – col 12 line 32- col 13 line 66

Claim 14: at least two epoxy reactive groups are the same – carboxylic, for example – col 13 line 56-62

Claim 15: epoxy reactive groups can be different: amine or carboxyl groups from the polyamide layer (Mickols col 4 lines 55-58) and carboxyl or amine groups as used by Marinaccio (col 12 and 13).

Claim 17: alkane diamine as per the formula – see col 11 line 30; col 12 lines 50-60. The formulae in this claim when substituted with hydrogen for the various R groups, would result in the formula of the reference.

Claims 19, 20 and 28: Marinaccio may not be listing the exact carboxylic or sulfonic acids listed as in these claims, but teaches polyfunctional carboxylic or sulfonic acids in col 13 line 55 – col 14 line 11, which would afford anionic (negative charged) membrane, or compounds having zwitter ions in col 14 lines 55-68, as recited in the specification page 19, 4<sup>th</sup> para 4 and page 20, 1<sup>st</sup> para, and therefore, equivalent. In this case, the prior art element: (A) performs the identical function specified in the claim in substantially the same way, and produces substantially the same results as the corresponding element disclosed in the specification. *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000). (B) is not excluded by any explicit definition provided in the specification for an equivalent. A person of ordinary skill in the art would have recognized the interchangeability of the element shown in the prior art for the corresponding element disclosed in the specification. *Caterpillar Inc. v. Deere & Co.*, 224 F.3d 1374, 56 USPQ2d 1305 (Fed. Cir. 2000); *Al-*

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Site Corp. v. VSI Int'l, Inc., 174 F.3d 1308, 1316, 50 USPQ2d 1161, 1165 (Fed. Cir. 1999); Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus. Inc., 145 F.3d 1303, 1309, 46 USPQ2d 1752, 1757 (Fed. Cir. 1998); Lockheed Aircraft Corp. v. United States, 193 USPQ 449, 461 (Ct. Cl. 1977); Data Line Corp. v. Micro Technologies, Inc., 813 F.2d 1196, 1 USPQ2d 2052 (Fed. Cir. 1987). Also, a prima facie case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities. "An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound, in the expectation that compounds similar in structure will have similar properties." In re Payne, 606 F.2d 303, 313, 203 USPQ 245, 254 (CCPA 1979). See In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) and In re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1991) (discussed in MPEP § 2144) for an extensive review of the case law pertaining to obviousness based on close structural similarity of chemical compounds. See also MPEP § 2144.08, paragraph II.A.4.(c). "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968); In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

Claims 18 and 27: cross-linking agent is diethylene triamine, etc – col 11 lines 20-30. Applicant has deleted common amines listed by the reference from the instant claims by this amendment. However, since the applicant has a large group of amines



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claimed, the compounds presented in the claim would be considered equivalent to the compounds in the reference, unless applicant can show substantial and unobvious difference in the resulting membrane product(s). Examiner also could not locate any of these claimed amines in the working examples provided by the applicant.

In all the above claims, as in claim 1, it would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Marinaccio in the teaching of Mickols for having cationic, anionic or zwitterion membranes because it makes the membrane sanitizable or strilizable, and capable of capturing anionic, cationic and other particles smaller than the effective pore size of the membrane (Marinaccio col 5 line 55 – col 6 line 11).

Claims 71, 72, 74 and 75: four epoxy groups: Marinaccio uses poly epoxies – there for has more than 4 epoxy groups (col 4 – formula). The compounds listed in claim 72 and 75 could be represented by the formulae in col 12, or are their equivalent, unless the applicant can show substantial and non-obvious difference in the resulting membrane products.

2. Claims 16 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mickols (853) in view of Marinaccio et al (US 4,915,839) as in claim 13 above and further in view of Linder (US 4,778,596).

Mickols in view of Marinaccio does not teach using a polyol as crosslinking compound as in the instant claims. Linder teaches coating a semipermeable membrane with a hydrophilic coating comprising an epoxy compound and a polyol such as PVA

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(col 4 lines 50-68; col 5 lines 1-35; col 7 lines 5-40 and 45-50; col 9 line 43-55; col 10 lines 63-68). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Linder in the teaching of Mickols in view of Marinaccio for making a hydrophilic cross-linked reverse osmosis membrane with improved solvent, pressure and temperature resistance (see abstract).

### ***Response to Arguments***

Applicant's arguments filed 3/22/04 have been fully considered but they are not persuasive.

Arguments re the 102(e) rejection are moot – new grounds for rejection.

In response to applicant's argument that the claims are unobvious over Mickols in view of Marinaccio because Mickols and Marinaccio have different manner and different purpose for the use of the polyfunctional epoxies: the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Applicant also argues that applicant uses the cross-linking to reduce the fouling characteristic of the membrane whereas Marinaccio uses it to improve the filtering capacity – again, it is not necessary that the suggestion to combine has to be what the applicant intended, but what the prior arts would suggest. Re

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applicant's argument that coating Marinaccio cross-linking formulation on the Mickol's polyamide membrane would result in substantial loss of flux, and therefore, one of ordinary skill in the art would not make such a modification: this argument lacks merit because it is speculative, only an opinion of the applicant, and there is no evidence to support it. Mickol's polyamide membrane is the same as that of the applicant, and Marinaccio's cross-linking compositions are also same as that of the applicant. If applicant does not have any loss of flux, why would the teaching of the combination of references have?

In response to applicant's argument about the Linder reference: Linder reference is used to show the use of polyols, and not for any other deficiencies as stated in the rejection. Therefore, the argument is not persuasive. If this reference had polyamide layer on it, it may have become an anticipatory reference. Once again, in response to applicant's argument that the reference uses the compounds in a different manner than what the applicant uses (because there is no intervening polyamide layer on the reference): The reference uses polyol to cross-link with an epoxy, which is not in any different manner different from what the applicant's endeavor. The primary reference teaches the crosslinking using epoxy on polyamide membrane, but not with a polyol. Linder suggests use of polyol for improved solvent, pressure and temperature resistance. Therefore, one of ordinary skill in the art would use the combination.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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